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EFFECTIVENESS OF STARTUP CARDS IN SPARKING BUSINESS IDEAS VIA GAMIFICATION

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Abstract

This study examines the effectiveness of StartUp Cards as a gamification-based learning tool to enhance students' business ideation abilities. Although gamification has been increasingly applied in entrepreneurship education, empirical evidence on its direct impact on business ideation particularly through structured tools such as StartUp Cards remains very limited. Many students continue to struggle to generate and structure business ideas using conventional methods such as paper-based brainstorming, highlighting the need for interactive and guided media that can systematically support the ideation process. StartUp Cards were introduced to address these limitations by providing structured prompts and multimodal stimuli that help students explore business ideas more effectively. The Paired Sample T-Test results indicated a significant improvement in the experimental group, with pre-test scores (M = 9.00; SD = 0.79) rising to post-test scores (M = 19.24; SD = 0.83), yielding a mean difference of −10.24. The medium effectively created an engaging learning environment and encouraged creativity through its gamified design, which supports divergent thinking. These outcomes are consistent with constructivist learning theory, emphasizing active engagement and experiential learning. Thus, StartUp Cards can be recommended as an effective alternative medium for fostering entrepreneurial skills, especially during the initial stages of business planning.

Keywords: StartUp cards, entrepreneurship, gamification, business ideation.

Introduction

The development of business ideas is a strategic element in entrepreneurship education (Achamadi et al., 2025; Suci Indah Larassati et al., 2024; Efiana Manilang et al., 2024), as it serves as the foundation for the entire entrepreneurial processfrom business planning to operational implementation. In the context of higher education, particularly in study programs that integrate entrepreneurial values, students' ability to design innovative, solution-oriented, and market-feasible business ideas is a key indicator for measuring the success of the learning process.

Business ideas not only reflect an individual's creative capacity (Ramadhan Lubis et al., 2024; Idris et al., 2025; Jelita et al., 2023), but also demonstrate students' competence in identifying real-world problems in their surroundings and offering solutions that are socially and economically relevant. Therefore, the process of developing business ideas must be supported by learning approaches that foster critical, analytical, and creative thinking skills. Without an appropriate approach, students tend to produce conventional business ideas that fail to address the actual needs of society.

Field observations indicate that many students struggle to develop potential business ideas (Purba et al., 2024; Hadiyati & Fatkhurahman, 2023; Mardatilah & Hermanzoni, 2020). This issue often arises from limited market insight, a lack of entrepreneurial experience, and the absence of learning methods that support systematic exploration. To overcome this, schools need practical and contextual learning approaches that promote active student engagement. Business ideation should be treated as a strategic component of entrepreneurship education, not just an administrative step. Gamification-based learning offers an effective alternative to create an interactive environment that encourages the development of high-quality, market-oriented business ideas.

One of the fundamental issues in the implementation of entrepreneurship education in higher education institutions is the low level of creativity and active participation among students in designing business ideas (Noviar et al., 2024;

Tumangger et al., 2025; Widiyanti, 2021). Although entrepreneurship courses have been integrated into the curriculum across various study programs, their implementation has not fully succeeded in encouraging students to think creatively and generate innovative ideas that align with market needs. This condition may be influenced by various internal and external factors. Internally, students often face challenges in generating business ideas due to limited practical experience, a lack of awareness of social and economic issues around them, and a fear of failure that restricts their willingness to explore ideas(Hakim, 2022; Budiman, 2024; Samanci et al., 2020; Sodha et al., 2024). On the other hand, learning models that remain focused on traditional lectures and written assignments also hinder active student participation. Furthermore, learning environments that do not provide space for exploration, collaboration, or practical simulation serve as additional obstacles to the development of students' creative potential.

In academic settings, although students often express an interest in entrepreneurship, many still lack the courage and confidence to articulate their ideas independently (Marpaung & Situmorang, 2023. Their tendency to repeat existing ideas or imitate business models indicates limited exploration and innovation skills. This underscores the need for learning methods that stimulate intrinsic motivation and promote active engagement in the ideation process. A more contextual, participatory, and enjoyable approach such as using gamified media can help simplify idea development, enhance emotional engagement, and build students' confidence in early entrepreneurship learning.

Gamification is an innovative approach in education that integrates game elements into non-game learning processes with the primary goal of enhancing motivation, engagement, and active participation of learners (Marpaung & Situmorang, 2023; Mee et al., 2021; Walaszczyk & Arnab, 2025). Elements such as challenges, points, levels, rewards, and real-time feedback are integral components of gamified learning design, which significantly contributes to creating a more engaging and interactive learning experience. In the context of entrepreneurship education, this approach offers an effective alternative to overcome the limitations of traditional teaching methods, which often tend to be monotonous and provide limited opportunities for exploration and active student involvement.

The gamification approach is considered effective in fostering students' emotional engagement in the learning process by creating a healthy competitive atmosphere and a measurable achievement system (Martdana & Atno, 2025; Septiani et al., 2025; Jusuf, 2016). Participation in gamified activities not only encourages students to reach specific academic outcomes but also helps them develop skills in idea exploration, teamwork, and creative problem solving. This, in turn, contributes to strengthening intrinsic motivation, which is essential in the formulation of business ideas and decision making within the field of entrepreneurship. Furthermore, gamification enables the creation of a flexible and responsive learning environment (Rudiyanto et al., 2024; Septiani et al., 2025; Fajriati et al., 2024), where students can learn from mistakes through direct experience in simulations and experimentation. The rapid and specific feedback mechanisms embedded in gamified systems provide opportunities for students to reflect on their thinking processes, as well as to evaluate and refine the strategies used to achieve their learning objectives. Thus, gamification impacts not only the cognitive aspect of learning but also positively influences the affective and social dimensions of the learning process.

In its implementation, the use of gamified media such as *StartUp Cards* in entrepreneurship courses has proven effective in encouraging the emergence of creative ideas among students. Through this medium, students are given the opportunity to design business ideas in a collaborative, engaging, and real-world context. This strategy aligns with the demands of 21st-century learning, which emphasize the development of critical thinking, problem-solving, and innovation skills. Therefore, the gamification approach is considered a strategic solution worth adopting in entrepreneurship education to enhance the quality and relevance of both the learning process and its outcomes.

StartUp Cards is a gamified learning medium specifically designed to support entrepreneurship education, with a primary focus on stimulating students' business ideas in a creative and interactive manner. The development of this tool incorporates key principles of gamification, such as structured instructional stages, thematic challenges, elements of surprise, and visually engaging designs to create a learning experience that is enjoyable and non-monotonous. Through

this approach, students are not only guided to understand business theories conceptually but are also encouraged to actively explore entrepreneurial ideas by directly engaging with the components provided in the cards.

By design, each card in *StartUp Cards* contains key elements relevant to the formulation of a business model, such as types of products or services, market segmentation, aspects of technology and innovation, as well as real-world challenges faced in the market context. The content is structured to broaden students' perspectives in developing business ideas that are logical, contextual, and innovative. The open and exploratory nature of this medium facilitates a learning process that is collaborative, discursive, and participatory, thereby creating a more meaningful and applicable learning experience.

The strength of StartUp Cards lies in its ability to engage students cognitively, affectively, and socially. This game-based approach allows students to express ideas more confidently, solve business challenges, and structure their ventures systematically aligning well with learners who respond better to interactive, experiential methods. Beyond serving as a learning tool, StartUp Cards act as an idea catalyst that helps connect entrepreneurial theory with practical application, enabling students to transform abstract concepts into concrete business models. Thus, StartUp Cards function as a strategic medium that supports project-based learning and enhances students' ability to design creative, solution-oriented, and market-driven business ideas.

Although interest in applying gamification to boost creativity and student engagement continues to rise, empirical evidence about its effectiveness especially in enhancing business ideation skills remains scarce. Most existing research has concentrated on gamification's influence on motivation, learning engagement, or conceptual understanding, while only a few studies have explored its direct contribution to guiding students through a structured process of developing entrepreneurial ideas. Furthermore, no empirical study has specifically investigated the effectiveness of StartUp Cards as a gamified tool created for ideation in entrepreneurship education. This gap highlights the need for a systematic evaluation to determine whether StartUp Cards can effectively help students overcome challenges in initiating, organizing, and refining business ideas.

In recent years, entrepreneurship education has become a strategic element in curriculum development at the higher education level (Fajriati et al., 2024; Tumangger et al., 2025), particularly in efforts to prepare graduates who are responsive to changes and challenges in the business world. The main goal of this education is to develop students' ability to think creatively and innovatively, as well as to formulate solutions to emerging problems in social and economic contexts. However, conventional learning approaches that focus solely on theory are considered insufficient to achieve these learning outcomes. Therefore, there is a need for learning media that can facilitate active student engagement through contextual and practical learning processes.

One of the innovative approaches increasingly adopted in entrepreneurship education is gamification (Saady et al., 2024; Hakeu et al., 2023; Rosli et al., 2019), One form of this approach is the use of StartUp Cards, an interactive medium designed not only to support content delivery but also to stimulate students' creativity in generating business ideas. Despite its potential, the effectiveness of this medium has not been empirically validated, making a systematic evaluation necessary.

Evaluating StartUp Cards is crucial to determine how effectively this gamified tool supports key learning outcomes, particularly the development of creative and feasible business ideas. This includes assessing indicators such as student motivation, conceptual understanding, engagement, and idea originality. Without empirical evidence, its effectiveness cannot be confirmed or used as a basis for instructional planning. The evaluation results will inform both academic discourse and institutional decisions on adopting innovative learning media, offering insights that can help improve entrepreneurship learning models to be more focused and impactful.

Therefore, this study aims to determine the effectiveness of StartUp Cards in enhancing students' business ideation abilities. By analyzing measurable outcomes related to creativity, structure, and market relevance of ideas produced, this research provides empirical evidence on the pedagogical value of StartUp Cards and supports the development of more effective entrepreneurship learning strategies.

Research Methods

Research Approach and Design

This study employs a quantitative approach with a quasi-experimental design, complemented

by the use of qualitative data to strengthen the interpretation of the results. The quantitative approach is applied to objectively assess the effectiveness of the *StartUp Cards* media in stimulating students' ability to generate business ideas through statistical analysis. Meanwhile, the qualitative approach is utilized to gain deeper insights into the learning process dynamics, students' perspectives, and the contextual use of the media within the classroom environment. Therefore, this research falls into the category of mixed methods, combining both types of data to obtain a more comprehensive understanding of the implementation and impact of gamification media in entrepreneurship education.

The research design employed is a pre-test and post-test with a non-equivalent group design**,** involving two groups: an experimental group that received instruction using *StartUp Cards*, and a control group that underwent conventional learning methods. Prior to the treatment, both groups took a pre-test to assess their initial ability in developing business ideas. After the learning process was completed, a post-test was administered to evaluate any changes or improvements in ability. The differences between the pre-test and post-test results in both groups serve as the basis for assessing the effectiveness of *StartUp Cards* as a learning aid.

In addition to collecting quantitative data through tests, this study also gathered qualitative data through observation and limited interviews with participating students. This qualitative information serves to complement the quantitative data by exploring students' experiences during gamified learning, including aspects such as motivation, interaction, and cognitive processes involved in formulating business ideas. The combination of these two approaches allows the researcher to gain an understanding that is not only measurable in numerical terms but also rich in contextual insight.

By employing a quasi-experimental design combined with qualitative data, this study is expected to make a meaningful contribution to the development of entrepreneurship learning models, particularly those based on interactive media such as *StartUp Cards*. This approach is also anticipated to support the external validity of the research findings and serve as a foundation for formulating relevant educational policies within higher education institutions.

Participants and Research Site

This research was conducted at the Asia Institute of Technology and Business Malang, a higher education institution committed to developing students' entrepreneurial competencies through the implementation of a practice-based curriculum. This location was chosen because the institution has integrated entrepreneurship courses and *Business in Practice* as part of its core curriculum, aligning well with the research focus of stimulating students' business ideas through the use of gamified learning media.

The research subjects were undergraduate students enrolled in the entrepreneurship course during the even semester of the 2024/2025 academic year. A total of 34 participants were involved in the study, divided into two groups: an experimental group consisting of 17 students who received instruction using the *StartUp Cards* media, and a control group of 17 students who participated in conventional learning methods such as lectures and discussions. The sampling technique used was purposive sampling, with inclusion criteria including active students who had never attended business idea development training and were willing to participate in the entire research process.

In terms of demographics, the research participants were students from the Management study program, ranging in age from 18 to 22 years old. In the experimental group, there were 9 female and 7 male students, while the control group consisted of 11 female and 6 male students. This composition reflects a sufficient level of diversity that is representative of the general characteristics of the student population at Institut Asia Malang.

The grouping process took into account the equivalence of participants' initial characteristics and was based on the available class divisions to minimize bias in the treatment administration. This study employed a pre-test and post-test design with non-equivalent groups, allowing for the measurement of changes in students' ability to develop business ideas before and after the intervention. Through this approach, the selection of the research site and the structuring of subjects were considered to support the implementation of a valid and methodologically accountable experiment.

Data Collection Techniques

In this study, data collection was carried out using various instruments designed to comprehensively capture information regarding the effectiveness of the *StartUp Cards* media in

stimulating students' ability to develop business ideas. The primary instrument used was a questionnaire, administered before and after the intervention (pre-test and post-test). The purpose of the questionnaire was to measure the improvement in students' ability to generate business ideas, particularly in terms of creativity, market relevance, and the practical value of the proposed ideas. The questionnaire was developed based on key indicators in the ideation process and underwent content validation to ensure the instrument's validity and reliability.

In addition, this study also utilized documentation of students' business idea outputs as supplementary data. These documents consisted of business model drafts or worksheets developed either individually or in groups. The analysis of these documents was conducted to evaluate the quality of the ideas generated and to examine students' thinking patterns throughout the learning process. This documentation also served as concrete evidence of the learning outcomes and played an important role in the data triangulation process.

To complement the mixed-methods approach, this study also used observations and semi-structured interviews. Observations captured students' participation, discussions, and idea exploration while using StartUp Cards, whereas interviews with selected experimental group students provided deeper insights into their perceptions and challenges. The qualitative data supported and clarified the quantitative results, enabling the study to present comprehensive and valid findings on how StartUp Cards enhance the effectiveness of entrepreneurship learning in higher education.

Table 1.
Definitions of Business Ideation Indicators

Ideation Indicator	Operational Definition	Scoring Output / What Is Measured
1. Idea Creativity	The extent to which students generate novel, original, or innovative business ideas that differ from existing solutions or demonstrate fresh perspectives.	**Novelty Score :** calculated from the average of items assessing originality and innovativeness of ideas.
2. Systematic Structure of the Idea	The degree to which the business idea is organized logically, including clear problem identification, defined target audience, coherent solution, and overall structured components.	**Idea Organization Score :** derived from items evaluating the clarity of the problem → solution → target market sequence.
3. Market Relevance	The suitability of the business idea to real market needs, including customer problems, potential demand, and alignment with user segments.	**Problem–Solution Fit Score :** calculated from items assessing market needs, user alignment, and market feasibility.
4. Ability to Refine Ideas	Students' capacity to revise, improve, and elaborate their business ideas based on feedback, reflection, or iterative thinking processes.	**Idea Iteration Score :** derived from items measuring the ability to enhance and elaborate ideas.
5. Effectiveness of Gamification Elements	The extent to which gamification features (cards, challenges, interactive activities) enhance engagement, motivation, and active participation during the ideation process.	**Engagement & Motivation Score :** calculated from items assessing learning engagement and motivational impact of gamification.

The instrument evaluates five core aspects of business ideation idea creativity, idea structure, market relevance, idea refinement, and the impact of gamification each measured through 3–4 items. A four-point Likert scale (ranging from 1 = very ineffective to 4 = very effective) was applied to capture participants' perceptions more decisively by eliminating any neutral response option.

Each dimension is operationalized and associated with a specific scoring output: creativity is reflected in the *novelty score*, structural clarity in the *idea organization score*, market relevance in the *problem–solution fit score*, refinement ability in the *idea iteration score*, and gamification impact in the *engagement and motivation score*. Example items, such as "StartUp Cards help me generate more creative business ideas," are provided to illustrate how statements are structured and evaluated.

Validity testing was carried out using Pearson item–total correlations, with all items surpassing the required significance level of $p < .05$, thereby confirming strong construct validity. Reliability analysis produced a Cronbach's Alpha of .705, indicating adequate internal consistency across the items. A concise table summarizing each indicator and its corresponding scoring metric has been added to strengthen clarity, replicability, and the overall methodological rigor of the instrument.

Data Analysis Techniques

This study used a quantitative approach supported by qualitative insights to provide a comprehensive analysis. Quantitatively, the effectiveness of the StartUp Cards in enhancing students' business ideation skills was examined through pre-test and post-test comparisons using paired sample t-tests, while independent t-tests compared outcomes between the experimental and control groups. Gain score analysis was also conducted to assess improvements in creativity, market relevance, and the practicality of the ideas produced. Quantitative data processing was conducted using statistical software such as SPSS to ensure the accuracy of the analysis and the validity of the results. The interpretation of statistical outcomes was based on significance values (p-values), taking into account the context of implementation and the characteristics of each group to ensure that the conclusions drawn accurately reflect the actual conditions.

Qualitative data from observations and interviews were analyzed thematically to identify patterns of student engagement, perceptions of the StartUp Cards, and learning dynamics. These

insights complemented the quantitative results by offering deeper explanations of how the gamification approach supported business ideation. The integration of both analyses provides strong empirical evidence and contextual understanding of the effectiveness of StartUp Cards as an interactive entrepreneurship learning tool.

Results and Discussion

Result

A key stage of this study involved evaluating the effectiveness of the Startup Cards on participants' ability to develop business ideas. Pre-test and post-test assessments were given to the experimental group before and after using the media, and the results were analyzed to identify changes in understanding. The findings were then visualized in a graph to simplify interpretation of participants' progress.

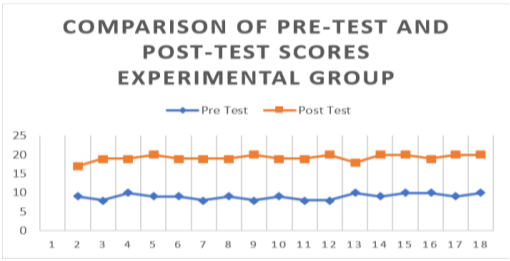

Figure 1. Comparison of Pre-Test and Post-Test Results of the Experimental Group

Figure 1 compares the pre-test and post-test scores of the experimental group that used the Startup Cards in entrepreneurship learning. The graph shows that all participants achieved higher post-test scores, with results appearing more stable and within a higher range than the more varied and lower pre-test scores. These findings demonstrate that the Startup Cards effectively improved participants' understanding in designing business ideas, supporting more creative, structured, and practical idea development.

This study also included a control group that did not use the Startup Cards to observe how understanding improved without the gamified intervention. The same pre-test and post-test instruments were administered, and the results were visualized in a graph to show score changes among control group participants, as presented in Figure 2.

Figure 2 shows the comparison of pre-test and post-test scores in the control group, which learned without the Startup Card media. Although there is some increase from pre-test to post-test, the improvement is relatively small and inconsistent across participants. The gains are not as strong or uniform as those observed in the experimental group. This indicates that conventional learning methods have a limited effect on strengthening students' understanding of entrepreneurship, particularly in developing business ideas. These results highlight the importance of innovative learning media to boost engagement and achieve more optimal learning outcomes.

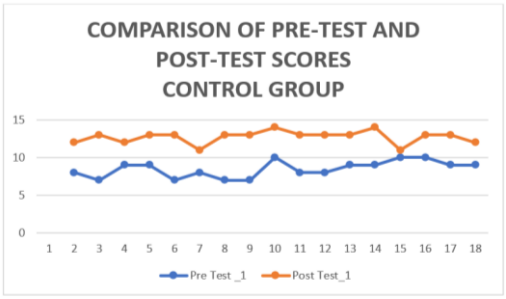

Figure 2. Comparison of Pre-Test and Post-Test Scores in the Control Group

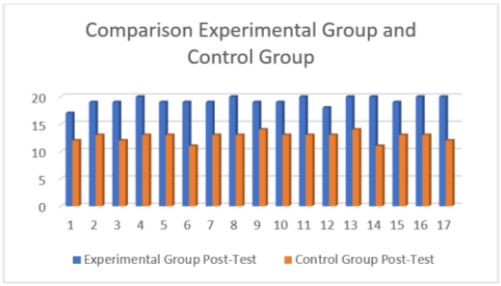

Figure 3. Comparison of Post-Test Results Between the Experimental and Control Groups

Figure 3 shows that the experimental group consistently achieved higher post-test scores than the control group, indicating that the use of StartUp Cards had a substantial positive effect on students' ability to explore and develop business ideas. The experimental group produced not only a greater number of ideas but also ideas that were more original, market-relevant, and feasible. Meanwhile, the control group tended to generate more generic and less structured ideas due to the absence of interactive stimulation. These results reinforce that StartUp Cards effectively enhance students' creative and practical thinking in producing more refined business concepts.

In comparing the post-test results of the experimental and control groups, the effect size for the independent t-test reached d = 2.87, which

is also classified as extremely large. This demonstrates that the difference between groups is not marginal but represents a very strong intervention impact. While the control group also showed a slight increase from pre-test to post-test, the variance among their scores remained wider and the improvement less consistent. In contrast, the experimental group demonstrated not only higher mean performance but also more stable and homogeneous learning outcomes.

The reduced variability and higher consistency in the experimental group suggest that StartUp Cards supported students across different starting points by providing structured guidance, targeted prompts, and clear ideation pathways. In statistical terms, this pattern supports the conclusion that the observed improvement is attributable to the intervention rather than natural learning progression or random variation.

Table 2.
Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre_test	9.0000	17	.79057	.19174
	Post_test	19.2353	17	.83137	.20164

The magnitude of improvement from pre-test to post-test in the experimental group was substantial. The average score increased from 9.00 to 19.24, representing an improvement of 113.7%. This large gain is supported by the effect size analysis, where Cohen's d was calculated at 3.25, indicating an *extremely large* effect according to established benchmarks ($d > 0.80$). This suggests that the learning gains were not only statistically significant but also exceptionally meaningful in practical terms.

In terms of variance, the standard deviation decreased from 0.79 (pre-test) to 0.83 (post-test), showing that although scores increased sharply, the distribution remained tight and did not widen. This indicates that the intervention produced a relatively homogeneous improvement, where nearly all students benefited similarly from the StartUp Cards. The visual pattern in the graph also supports this, showing that the post-test scores cluster more tightly within a higher-range band, while the pre-test scores exhibited more dispersion.

The normality test results for the post-test scores indicate that the data are not normally distributed, as shown by the Kolmogorov–Smirnov significance value of 0.002 and the Shapiro–Wilk significance value of 0.001. Both values fall below the 0.05 threshold, suggesting that the distribution of post-test scores deviates statistically from a normal curve. This non-normality does not represent a weakness in the data; rather, it reflects a pattern of very high and uniform improvement among participants after using StartUp Cards. This is evident from the mean post-test score of 19.24 out of a maximum score of 20 and a very small standard deviation (SD = 0.831), indicating that nearly all students achieved high scores within a narrow range. Such a pattern demonstrates that StartUp Cards effectively stimulated students' ideation skills, enabling them to generate business ideas that are more creative, structured, and market-relevant. Therefore, the non-normal distribution of the data serves as an indicator of the success of the StartUp Cards in enhancing students' abilities consistently and evenly.

Table 3.
Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Pre_test & Post_test	17	-.095	.717

Furthermore, the statistical test results showed a t-value of -35.153 with degrees of freedom (df) of 16, and a significance value (Sig. 2-tailed) of 0.000. Since the significance value is far below the critical threshold of 0.05, it can be concluded that there is a statistically significant difference between the pre-test and post-test results. Therefore, the null hypothesis (H_0), which states that there is no difference, is rejected, and the alternative hypothesis (H_1) is accepted.

Table 4.
Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre_test - Post_test	-10.23529	1.20049	.29116	-10.85253	-9.61806	-35.153	16	.000

In addition, the 95% confidence interval analysis for the mean difference yielded a range between -10.85 and -9.62, which lies entirely below zero. This further reinforces the conclusion that the improvement in students' ability to develop business ideas following the use of the StartUp Cards media is real and not due to chance. Overall, these results indicate that the use of interactive, gamification-based learning media such as StartUp Cards has been proven to have a positive and significant effect on enhancing students' skills in the business ideation process. This finding supports the relevance of implementing

innovative media in entrepreneurship education, particularly within the context of higher education, which demands active and contextual learning approaches.

Figure 4. Documentation of StartUp Card Usage in the Entrepreneurship Course

The use of StartUp Cards in the experimental group significantly improved both the quantity and quality of students' business ideas. Before the intervention, most participants produced only one generic idea or had no clear business concept at all. After the StartUp Card sessions, they were able to generate two to three more focused, structured, and realistic ideas. This improvement stems from the deliberate design of the StartUp Cards, which guide students to think creatively and critically by exploring essential components of a business plan, including problem identification, solution formulation, target market analysis, business model creation, and marketing strategy planning.

Figure 5. StartUp Cards

In terms of quality, the business ideas produced after the intervention showed clear improvements in innovation, relevance to community needs, sustainability potential, and feasibility. Participants became better at linking their ideas to real-world problems and proposing practical solutions. Their ideas also appeared more complete and structured, supported by the holistic thinking encouraged through the StartUp Cards. These results indicate that StartUp Cards effectively enhance not only the quantity but also the overall quality of business ideas, making them a suitable tool for early-stage entrepreneurship learning, especially for beginners with limited prior experience.

Figure 6. Analysis Results of StartUp Card Utilization

The development of a business idea using StartUp Cards resulted in the concept of *"AgriNest" a Smart Greenhouse Based on IoT for Modern Agriculture***.** This idea is rooted in the plantation sector as the primary product, targeting men and women aged 25–55, particularly local residents and housewives. The main challenges identified include poor water quality and inconsistent harvests. The innovative solution proposed is the implementation of smart greenhouse technology. This innovation incorporates the use of the Internet of Things (IoT) to monitor and regulate key variables such as temperature, humidity, water quality, and lighting automatically. The system is also equipped with an automatic drip irrigation feature and a platform for marketing the harvest through e-commerce. The goal is to improve agricultural efficiency, ensure optimal plant growth, and produce consistent, high-value yields. This technology-based approach is highly relevant for addressing the needs of small to medium-scale farmers in overcoming the challenges of modern agriculture.

Based on the research findings, the use of StartUp Cards has been proven to significantly contribute to the increase in the number of business ideas developed by participants. Participants in the experimental group, who previously could

only generate a single, narrowly scoped business idea, were able after the intervention to propose two to three more varied and contextually relevant business concepts. This improvement is attributed to the structure of the StartUp Cards, which present a combination of essential elements such as market challenges, product ideas, and consumer profiles. These components effectively stimulate participants' creative thinking in exploring various entrepreneurial alternatives. This condition indicates that the medium successfully creates a conducive learning environment for idea development, where participants are encouraged to think freely while remaining within a guided and systematic framework.

The increased number of business ideas generated by participants in the experimental group after using StartUp Cards indicates that this medium is effective in supporting the creative thinking process. Various elements within the cards such as simulated market challenges, a range of innovative product ideas, and consumer profiles serve as key triggers that stimulate participants' imagination and analytical thinking skills. By presenting a clear context while maintaining flexibility, the cards encourage participants to explore a variety of alternative solutions with the potential to be developed into viable business ideas. This process not only broadens their thinking perspectives but also promotes the formulation of ideas in a more structured and logical manner. This approach aligns with constructivist learning theory, which emphasizes active learner engagement with meaningful stimuli. Therefore, the effectiveness of StartUp Cards in increasing the number of business ideas underscores the importance of using interactive and contextual learning media to gradually and sustainably strengthen entrepreneurial skills.

In the context of entrepreneurship education, the gamification approach serves as an effective strategy to create a more engaging learning process that fosters active participant involvement. One of the media that implements the principles of gamification is *StartUp Cards*, which are designed through a series of cards containing challenges, game flows, and mechanisms for exploring business ideas. This medium provides participants with the opportunity to make independent decisions in formulating the direction and structure of the business ideas they aim to develop.

Figure 7. The Relationship Between Gamification and Creativity in the Use of StartUp Cards for Business Idea Development

One of the key advantages of the gamification approach is its ability to stimulate creativity. In the field of entrepreneurship, creativity reflects an individual's capacity to generate ideas that are novel, unique, and aligned with market needs. *StartUp Cards* function as visual and narrative tools that promote divergent thinking the ability to identify multiple alternative solutions to a single problem. Through a combination of elements such as consumer profiles, product inspirations, and market challenges, participants are encouraged to evaluate situations more broadly and develop innovative and relevant business ideas.

In addition, *StartUp Cards* help create a learning environment that is conducive to open yet structured idea exploration. The game's flexible nature, combined with a clear structure, allows participants to express their ideas freely without fear of making mistakes an obstacle that often hinders the ideation process. This approach aligns with constructivist learning theory, which emphasizes the importance of direct experience and active engagement in knowledge construction. As a result, participants are not only engaged in simulating business planning but also learn to develop ideas in a logical, systematic, and solution-oriented manner.

By integrating elements of gamification and creativity, *StartUp Cards* emerge as an innovative learning medium with strong potential to enhance entrepreneurial competence, particularly in the early stages of business idea exploration and development. The combination of enjoyable gameplay and educational content creates a holistic learning experience, where participants' cognitive, affective, and social aspects are developed simultaneously. Therefore, *StartUp Cards* are not merely a supporting tool, but also a strategic medium for cultivating participants'

creative and innovative thinking within the context of entrepreneurship.

The successful implementation of *StartUp Cards* as a learning medium for entrepreneurship is influenced by several critical factors. One of the key factors is the facilitator's readiness to understand the game mechanics and their ability to guide participants effectively. A facilitator who can clearly direct the learning process will help participants gain a more structured and meaningful learning experience. In addition, participant characteristics such as their level of motivation, openness to new approaches, and creative thinking skills also play a significant role. Active and responsive participants tend to benefit more optimally from the use of this medium.

Time is also a factor that cannot be overlooked. The process of developing creative ideas requires sufficient time for reflection and evaluation of alternative solutions; thus, time constraints can hinder the full exploration of an idea's potential. On the other hand, a supportive learning environment such as a collaborative atmosphere free from assessment pressure enhances participants' comfort in exploring ideas. Additionally, the quality of the *StartUp Cards* design plays a crucial role; content that is relevant, challenging, and contextual is more likely to stimulate participants' thinking in designing business ideas. Therefore, to optimize the effectiveness of *StartUp Cards*, a synergy is needed among the facilitator's competence, participant readiness, adequate time allocation, a conducive learning environment, and high-quality media content. The combination of these factors will foster a comprehensive and impactful learning experience.

Discussion

The findings of this study indicate that the use of *StartUp Cards* has a significant positive impact in stimulating the emergence of business ideas among prospective entrepreneurs. Through a gamification approach, this medium successfully creates an engaging and interactive learning environment, while also encouraging active participant involvement in the process of generating business ideas. This aligns with the perspective of (Seaborn & Fels, 2015), who emphasize that the application of game elements in educational contexts can enhance intrinsic motivation and cognitive engagement among learners. Furthermore, the increase in both the quantity and quality of business ideas within the experimental group demonstrates that *StartUp Cards* are effective in stimulating divergent thinking the ability to generate multiple alternative solutions which lies at the core of creativity in the entrepreneurial world.

The significant improvement in learning outcomes can be explained through gamification and motivational psychology. StartUp Cards include elements such as progressive challenges, instant feedback, clear goals, and autonomy, which stimulate intrinsic motivation based on Self-Determination Theory (SDT). By giving students freedom in shaping ideas, a sense of competence through structured guidance, and opportunities for collaboration, the cards increased engagement and made learning more meaningful. As a result, the experimental group showed higher and more consistent performance, as intrinsically motivated learners tend to invest more effort and persist longer in completing tasks

From a constructivist perspective, the success of StartUp Cards shows the value of active, experience-based learning in helping students build their own understanding. The cards act not only as information aids but also as exploratory tools that help students link real problems with self-designed solutions, strengthening their grasp of key business planning concepts. Their effectiveness lies in stimulating idea generation while fostering a logical, systematic, and reflective entrepreneurial mindset. Consistent with constructivist theory, StartUp Cards promote learning through active engagement, inquiry, and reflection. By providing open-ended prompts and contextual scenarios, they stimulate divergent thinking and encourage students to produce multiple, original business ideas. The improvement in both the quantity and novelty of ideas in the experimental group shows that the cards functioned as cognitive scaffolds that supported exploratory reasoning and iterative idea refinement.

The successful implementation of *StartUp Cards* in this study cannot be separated from the flexibility of the medium, which enables it to accommodate diverse student learning styles. The presence of visual, narrative, and interactive elements in each card allows participants with visual, auditory, or kinesthetic learning preferences to gain an optimal learning experience. This aligns with the principles of multimodal learning, which emphasize that delivering material in multiple formats can enrich the process of knowledge

internalization and enhance information retention. In this regard, *StartUp Cards* function not only as an engaging learning tool but also as an inclusive and adaptive pedagogical medium. The integration of gamification elements such as thematic challenges, point systems, and immediate feedback fosters healthy competition and boosts students' emotional engagement. Consequently, StartUp Cards support not only cognitive learning but also strengthen the affective aspects needed to develop entrepreneurial character.

From a collaborative perspective, observations show that the medium encourages active discussion, idea sharing, and negotiation core elements of collaborative learning. These interactions allow students to validate, critique, and refine their ideas through peer feedback, expanding their insights while strengthening essential social and communication skills for today's competitive business environment.

Moreover, the findings of this study carry significant practical implications for the development of entrepreneurship curricula in higher education (Seaborn & Fels, 2015; Keshmiri, 2025). Integrating gamified media like StartUp Cards into entrepreneurship courses is an effective way to connect theory with practice while matching the interactive learning preferences of today's students. These findings can guide the development of relevant and applicable learning programs that strengthen key 21st-century skills, especially creativity, collaboration, communication, and problem-solving.

Although the findings are promising, the effectiveness of StartUp Cards may be affected by factors such as students' prior knowledge, group dynamics, and facilitator support. Therefore, further research is needed to examine these variables more deeply, including comparisons across different contexts and institutions, to better understand the strengths and limitations of this medium.

Conclusions and Implications

The findings indicate that StartUp Cards are more effective than traditional methods in stimulating students' business idea generation. Their gamified and interactive design enhances engagement, creativity, and the quality of ideas, making them a suitable innovative tool for developing early entrepreneurial skills. Further studies with larger samples and longer observation periods are recommended, along with continuous feedback to refine the cards' features and ensure their ongoing relevance in entrepreneurship education.

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